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VOL. XVII DECEMBER, 1930 No. 11

EDITORIAL

The Christmas Spirit

Once more we are looking forward to the season of the year when all of us are children again. It matters little how old we are, Christmas time recalls the days of our childhood, which is just as it should be. It would be a much better world to live in if we would carry the real spirit of Christmas with us throughout the year and all through our lives. Unfortunately, the year which is quickly drawing to a close has been one of hardship and disappointment to a great many. The business depression has thrown thousands out of employment, thus depriving them and their families of the pleasures which they ordinarily would enjoy. In some cases even the necessities of life have not been forthcoming. To such as these —and there are a great many—the Christmas season this year holds little of cheer and encouragement.

On the other hand, there are a lot of us who have not felt the pinch of hunger and poverty and have had no occasion to chase the wolf from the door. Would it not be in keeping with the real meaning of the holiday which we are soon to celebrate, if we gave our moral and financial support to the social and charitable workers who unselfishly devote their time and money to the relief of the afflicted and distressed, and bring cheer and comfort to those less fortunate than we are?

The Red Cross, the various community chests, and other local organizations for the relief of the poor and the welfare of humanity are appealing to us now as never before. The great majority of our membership can and will help these worthy causes. Even though we differ widely in creeds and politics, this great nation of ours has always been amongst the first to reach a helping hand to those in need. At this Christmas season when the call is so urgent, we will not fail to respond as we listen again to the Great Founder of

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Christianity when He said, "It is more blessed to give than to receive."

To President Gehling and his official family and to our whole membership both at home and abroad we wish you a happy and joyous Christmas and a great many of them.

THE DEPOSITION OF BRIGHT ZINC CADMIUM ALLOYS FROM CYANIDE BATHS

By C. J. Wernlund

Washington Convention, 1930

You will agree that remarkable scientific and practical progress has been made in the last decade in the electroplating field. Our meeting here at this time is a fitting tribute to the Bureau which has contributed to much and guided so wisely.

This progress is well illustrated by the fact that even such old and well established processes as nickel and copper plating have been materially improved, not to mention the newer developments. From platinum plating on the one hand to iron plating on the other, the entire industry has moved forward. Ten years ago cadmium and chromium were almost rare metals in the metallic stage. Today thousands of pounds of these metals are plated daily.

One of the decidedly helpful of the many improvements for the advancement and expansion of the plating industry has been the development of lustrous or bright plating processes. When chromium plating came along, smooth bright plate was of utmost importance, because it was too much to buff off, and anyway there wasn't any excess metal to buff off, so conservation was vital. When bright cadmium came along, it too was accepted with open arms as a long lost brother. These processes did more to advertise the science of electroplating to the general public than most of us realize.

Today we bring you advance notice of another bright plating process—the deposition of zinc-cadmium alloys, in which the cadmium can vary from about 8% to 15%. (Exhibits specimens of plated work.)

This work had its origin back in 1923, and was one of the earlier research problems carried out in our laboratory which secured for us patents covering the deposition of zinc-cadmium and zinc-cadmium-mercury alloys. The preliminary report on this work was made at the Providence meeting back in 1924.

Under the conditions first used, zinc-cadmium coatings were generally of a grayish-white color, and a small amount of mercury was therefore added to the anodes to improve the smoothness and appearance of the plate and eliminate the tendency of anode sponging.

About a year and a half ago when the price of cadmium was going high and higher, Mr. Oplinger and the writer set out to improve the zinc-cadmium alloy plating process. Our aim was to produce a coating having a color equal to that of bright cadmium plate. Within a month we had produced what we were after as far as appearance was concerned, namely, a bright, hard alloy plate, though we had to admit we didn't know just why we got the results we did. It seemed too good to be true.

Since then we have determined the effect of each of the following variables: zinc concentration, cadmium concentration, cyanide concentration, hydroxide concentration, temperature, anode current density, cathode current density and anode composition. We are now ready to pass on our experience to any plater who has to rustproof a product and our plate fits his need. Our method is:

After we had learned what type of bath gave the best results, the study of the possible variation in anode composition was undertaken. In this work we found that fairly bright plate could be secured within the range of about 8% to 20% of cadmium. The brightest and most pleasing deposits are secured, however, with anodes containing from 8% to 15% of cadmium. With these anodes under the proper operating conditions, as shown on the chart (showing chart) the bath automatically plates a bright alloy indefinitely, and that is really all there is to it. You will notice that the conditions required closely duplicate those used commercially in zinc cyanide and sulphate installations, and the conversion of a zinc plating solution to the bright alloy plate is a relatively simple task. You are probably wondering what manipulation was employed in making this bath plate bright. When operated under the conditions given on the chart, the bath automatically adjusts itself to bright plate. The nature of this particular process is such that it plates a bright coating.

We feel convinced that one of the major underlying causes for this unusual plate lies within the zinc-cadmium alloy anodes themselves. These alloys are hard and very fine grained, and when this composition of alloy is plated out of the bath, it just automatically duplicates the fine grained alloy structure of the anodes and a

polished plate is the result. No organic addition agent of any sort is needed. In fact, the process doesn't thrive on any gum drops tried.

(Uses hammer to demonstrate hardness of alloy anode as compared to zinc, breaking zinc anode, but only slightly bending alloy.)

The bath composition and operating conditions used in this process are as follows:

BATH CONCENTRATIONS

	Preferred		*Permissible Range*	
$Zn(Cu)_2$	75 g/L	10 oz./gal.	60-120 g/L	8-16 oz./gal.
NaCN	37.5 g/L	5 oz./gal.	30-60 g/L	4-8 oz./gal.
NaOH	90 g/L	12 oz./gal.	45-120 g/L	6-16 oz./gal.
CdO	3 g/L	0.27 oz./gal.	1.0-3 g/L	.13 to 0.4 oz./gal.

OPERATING CONDITIONS

Temperature .....20-40° C. 68-104° F.
Anodes .....8 to 15% Cd Balance Zn
Anode Current Density .....6 to 10 A/SF
Cathode Current Density .....13 to 60 A/SF (20/40 preferred)
E.M.F. .....1 to 3 as required
Cathode Current Efficiency .....90 to 106% (based on Zn)

We are now testing out the feasibility of supplying the bath as a concentrated solution all ready for operation, and to be shipped in a steel drum. For the present our plan is to install the process under our own supervision and give the plater our experience and work out any kinks together.

The following are the desirable qualifications for a successful commercial electrodeposit, which are met by BRITE-A-LOY:

1. Must rustproof iron.
2. Slow atmospheric rate of corrosion very desirable.
3. Pleasing bright finish often greatly desired.
4. Shoukl show good shelf aging properties.
5. Resistance to abrasion.
6. Must have reasonably high and closely balanced anode and cathode current efficiencies to eliminate fumes and stabilize bath.
7. Good adherence to steel.
8. Desirable to be able to plate pleasing, uniform coatings over wide range of current density so as to give uniform plate on recessed parts.
9. Process must be economical to compete with zinc, lacquer and other finishes.
10. Desirable to be able to plate malleable and cast iron.

CHAIRMAN GEHLING: We have just ten minutes to discuss this cadmium subject, so we are open for discussion. We are going to save the other paper until tomorrow morning.

MR. HARVEY GAUSING: I would like to ask the writer of this paper if he used this alloy deposition under nickel; that is, if he plated nickel on top of this, and then chrome plated the nickel, if they have tried that experiment?

MR. WERNLUND: Yes, it is possible. The alloy plate acts somewhat like zinc in plating. It is a little more difficult to plate than if it were iron, but it is possible to plate with nickel and follow that with chromium.

MR. SOHN: Do you use all your anodes of that 8% to 15% alloy?

MR. WERNLUND: We use 90/10. 8% to 15% is the range of the cadmium.

MR. SOHN: Do you use those anodes entirely, or do you intersperse with zinc?

MR. WERNLUND: We use all these anodes.

MR. SOHN: How do you maintain cadmium concentration?

MR. WERNLUND: Automatically.

MR. SOHN: Then all your cadmium doesn't dissolve, because your ratio shows 3 cadmium to 75 zinc. I don't know what the metallic ratio is.

MR. WERNLUND: The ratio in the bath is lower than it is in the anodes because cadmium plates out more readily. That is quite common of all alloy plating processes. I think the nickel-iron alloys work the same way. You will find more iron necessary in your anodes. If you have a 10% iron anode you will find less than 10% iron in the bath.

MR. SOHN: Is there any mercury in that?

MR. WERNLUND: None at all.

MR. SOHN: Another thing. Did you every try heat-treating that plated alloy to see what would happen to it? Say around 200° C. or something of that order? What I am thinking of here is the age hardening of zinc alloys and so on, and the changes occurring in intercrystalling structures and so forth. I was wondering if aging affected the hardness of this coating, or heat treating in any way.

MR. WERNLUND: Probably it does, but we cannot answer that question. It doesn't affect them very much; that is, they are all hard. We notice whether they cool slowly or are quenched, they are all quite hard. That is a topic we will have to look into.

DR. WM. BLUM: On that hardness demonstration—those bars are cast alloys?

MR. WERNLUND: Yes, containing 10% cadmium and 90% zinc.

DR. BLUM: So at least it is not proven by that test that the plated alloy is of corresponding hardness, although it might be presumed to be.

MR. WERNLUND: It is of similar hardness. It doesn't mean it is the same hardness, but probably it is hard because it cracks more readily.

MR. M. R. THOMPSON: On that point—that anode being only half bent, doesn't that indicate considerable brittleness?

MR. WERNLUND: The cast alloy is also brittle, but probably not quite as brittle as the plated alloy, because plating from cyanide, you know, always embrittles the coating somewhat.

MR. WM. GRUND: Are you ready to sell them in volume—the salts?

MR. WERNLUND: Not yet, but in a short time.

MR. KREIDEL: On a light plate, is the plate brittle enough to crack?

MR. WERNLUND: It doesn't crack off of base metal on light plate.

MR. KREIDEL: You take a steel spring; would the plate break under torsion in a spring?

MR. WERNLUND: I don't think so, not until long after the spring was broken.

MR. CALEF: Have you any idea of the cost of plating from a zinc cyanide bath?—Changing over to this type?

MR. WERNLUND: The only cost is the added cost of the cadmium, and that is partly counterbalanced by the fact you can use higher current densities, and more rapid rate of deposition, and if you are so situated that you can capitalize on that and cut down your labor or your overhead, the cost can balance fairly closely with zinc. Otherwise it is a little higher, of course.

MR. CALEF: You have no actual shop figures, then?

MR. WERNLUND: Yes, the process has been operated for about eight months commercially, and they are very well pleased with it. In one plant they are using about 4,000 gallons of bath.

MR. J. H. HOEFER: Might I ask what is the throwing power of this particular bath? Is it comparable with cadmium or zinc?

MR. WERNLUND: Comparable with the best zinc cyanide solution. High caustic solution, high conductivity, gives you a high

throwing power. We hope to have more data for you as time goes on. There are a thousand and one things you have to do, in this, one of which is to find uses for this particular alloy, and we hope you will help us in this respect.

MR. CALEF: Have you made any tests on the actual hardness of the deposit of this material as compared with zinc?

MR. WERNLUND: Those are planned, but haven't been finished. I just wanted to show you it was harder than zinc.

OXIDIZED COPPER, BRASS AND SILVER FINISHES ON ALUMINUM AND ITS ALLOYS

By R. E. Pettit

Washington Convention, 1930

The coloring or "oxidizing" of plated aluminum, as in the case of the coloring of other metals, depends upon the skill of the operator and the methods used. In the past the plating industry has avoided the coloring of plated aluminum because of the lack of successful plating procedures. Actually, it is as easy to plate on aluminum as other metals, and these electroplates are easy to color using the standard commercial methods. There are one or two precautions that must be taken.

Copper, over either a preliminary zinc or nickel coating, may be "oxidized" in the usual way by sulphide solutions to give various shades of brown and bronze. Brass or silver coatings over a preliminary nickel coating may be "oxidized" to various colors in the usual way and thus allow aluminum to be used in places where its physical properties and economy make it advisable and yet for reasons of surface appearance it is necessary to have a different color.

Zinc can be satisfactorily deposited on a smooth aluminum surface. Such a deposit will adhere well and resist corrosion. When another metal, such as copper, is plated over the zinc, the corrosion resistance of the plate falls considerably and the coating will blister and peel on very short salt spray exposure. The corrosion resistance may be increased by subjecting the article to a heat treatment. This heat treatment adds to the cost of the finished article and has no commercial application at present.

Oxidized copper finishes on aluminum, *over the preliminary zinc coating,* are not satisfactory unless the service to which the article is to be exposed is extremely mild and dry. Plates of brass and

silver over the preliminary zinc coating generally give trouble and are not usually recommended.

For general use a preliminary nickel coating is recommended. For detailed information on the mechanics of nickel plating on aluminum the paper by Work (Trans. Am. Electrochem. Soc. 43, 361, 1928) should be consulted. To present clearly the methods employed in obtaining "oxidized" effects on aluminum and its alloys, it will be necessary to briefly touch upon the application of a nickel coating on aluminum.

To successfully electroplate nickel on aluminum, the aluminum surface should first be given a special etching treatment. The type of roughening produced by a sand blast is not sufficient to secure good anchorage of the plate. It is necessary to produce a roughened surface with pits having a special undercut shape so that the coating electrodeposited in the pits will be securely anchored. A surface of this type is produced by chemical means which dissolves certain of the metal constituents selectively, and the character of these pits or undercuts varies greatly with the composition and temper of the metal being etched.

In nickel plating on aluminum and its alloys, the following procedure has been found satisfactory. The metal is first cleaned for about 30 seconds in a hot mild alkaline cleaner. Any mild commercial cleaner may be used. One to three ounces per gallon each of trisodium phosphate and sodium carbonate works satisfactorily. The cleaning operation is followed with a clean cold water rinse. If the work going through consists of sand or die castings, the cleaning treatment is followed with an acid etch composed of three parts of nitric acid (Sp.g. 1.42), and one part of (50%) hydrofluoric acid. This bath is used at room temperature. The etching time will vary greatly with bath temperature and alloy composition, die castings usually requiring about a 15 to 30 second etch, while sand castings are treated for a longer period, 60 to 120 seconds. When the casting has been properly etched it should be thoroughly rinsed in clean cold water and transferred to the nickel plating tank.

If the work going through consists of commercially pure aluminum, 2S, the water rinse, after the alkaline cleaning dip, is followed by a 5% hydrofluoric acid treatment and another clean cold water rinse. The hydrofluoric acid bath is used at room temperature, and a 10 to 15 second treatment in this bath is sufficient. The surface etching of the 2S metal is the next step in the procedure

and is accomplished with a bath of nickel chloride ($NiC1_2.6H20$) (37 ounces per gallon) and hydrofluoric acid (Sp.g. 1.18), (0.2 gallons per gallon of water). This bath may be varied within wide ranges to meet special requirements as the actual composition of the dip is not as important as the resultant adhesion of the electroplate. The effect of dip temperature on the dipping time is very marked and the temperature of the dip should be controlled or the time of dip varied to compensate for temperature changes. Generally a dipping time of 15 to 40 seconds is desirable for production work. After etching, the work should be thoroughly rinsed in clean cold water. It is then ready for nickel plating.

If the material being handled is either 3S (1.25% manganese) or one of the strong alloys known as 17S, 25S, and 51S, a slight change in the 2S procedure is made. A bath of manganous sulphate ($MnS0_4.2H_20$) (0.5 ounces per gallon) and hydrochloric acid (Sp.g. 1.18) (0.5 gallons per ½ gallon of water) is substituted for the nickel chloride-hydrochloric acid dip. After the work has been etched in the manganese bath it should be thorougly rinsed in clean cold water and transferred to the nickel plating tank. The time of dip in the above solution varies with the alloy composition and heat treatment and the bath temperature. The correct etching time will generally be found somewhere between 10 and 60 seconds.

In handling aluminum and its alloys through the dips, the proper timing must be carefully determined by experiment as it is the important step in the plating procedure. This is accomplished by plating various samples at different dipping times, breaking them, and noting the adhesion. A properly dipped sample will show no flaking of the nickel from the aluminum and should color buff readily. Under-dipped samples show poor adhesion, while over-dipped samples do not color readily. It should be understood that the etching solution must be adapted to the particular alloy composition which is to be plated, and experience has shown that even these solutions must be modified from time to time to meet special conditions.

In applying the nickel plate to the properly etched aluminum surface it may be said that any nickel plating bath which operates successfully for zinc will prove satisfactory for aluminum.

Up to the nickel plating of the aluminum, the procedure followed has been different from that followed when plating nickel on other metals. After the aluminum article has been coated with nickel it may be handled in the same manner as any other metal which

has been nickel plated, and over which brass, copper or silver is to be plated and colored.

For successful color work on aluminum the article should be plated with nickel for about 30 minutes to insure complete anchorage in the etching pits. It is not necessary to color buff the nickel before applying the electroplate that is to be "oxidized," although if desired this may be done. A coating of copper is applied over the nickel from an acid copper bath, and this plate is colored. If "oxidized" copper effects are desired, the work should be wiped to remove buffing grease and immersed in a coloring solution until the proper color has been produced. Brass or silver plates are best applied over a copper plate, and articles so plated may be colored in the usual way.

In studying "oxidized" or colored effects on copper, brass, or silver plated aluminum and its alloys a number of solutions were tried. For the browns and blacks on copper, ½ to one ounce per gallon of potassium sulphide gave very good results. The sulphide solution functions best when warm. A bath of potassium chlorate, 4 ounces per gallon, and copper sulphate, one ounce per gallon, gives a pleasing brown on copper plated aluminum. A solution composed of lead acetate, 2 ounces per gallon, and sodium hypo sulphite, 4 ounces per gallon, is very effective in producing several colors on copper plated aluminum. Colors such as straw, blue, purple, and gray may be obtained from this solution. This solution is used at about 150° F. The above solution is also very satisfactory in obtaining several shades of blue and purple on brass. The best "oxidized" effects, such as antique brass, are obtained on brass plated aluminum with a warm potassium sulphide dip composed of ½ ounce per gallon of sulphide, and a very weak warm sulphuric acid dip used alternately with a hot water dip. The operation is repeated until the desired color is obtained. A brown is produced on brass plated aluminum by an antimony trisulphide and caustic soda dip, but in working with this dip and others containing a high caustic content, special care must be taken. The necessary precautions will be discussed below. The potassium sulphide dip containing about ½ ounce per gallon of this salt is very satisfactory in producing "oxidized" effects and green on silver plated aluminum. The finishes mentioned above can be scratch brushed or high lighted with wet pumice to give any desired effect. The finished article should be dried and lacquered.

The presence of a high caustic content in a coloring dip gives

some trouble when coloring plated aluminum. As an example, an antimony trisulphide and caustic soda dip for coloring brass brown was made up containing 4 ounces per gallon of the antimony salt and 8 ounces per gallon of caustic. When a piece of brass plated aluminum was immersed in this dip, trouble invariably resulted. When the dip was modified so that just enough caustic was added to "take-up" the antimony salt and not have an excess of caustic, the bath functioned satisfactorily. During the period of this study of oxidized finishes on plated aluminum, stain spots on cast metal were encountered. These stain spots usually appeared within 48 hours after the article had been finished. Examination generally showed the area of stain to be around a slight pit in the metal, indicating that solution had been trapped in the pit and later had seeped out, discoloring the adjacent area. Care in washing the finished article will greatly reduce the possibility of these stain spots appearing. Crystal spots on metals having a metal sulphide finish have not been encountered, although under conditions more favorable for the formation of these spots some trouble may be encountered. For the methods of prevention of spotting on "oxidized" plated finishes, the research paper No. 72, Bureau of Standards, by W. P. Barrows, should be consulted.

The coloring of plated aluminum is as easily accomplished as the coloring of other metals. The success or failure of producing colored finishes on aluminum and its alloys lies in the application of the nickel coating. If the nickel coating is properly applied, copper, brass or silver may be readily plated over the nickel, and these coatings "oxidized" to give various colored effects now obtainable on other metals.

DR. A. K. GRAHAM: The methods of preventing the two kinds of spotting which are referred to in this paper—the result of the work of the research fellow of this Society—have been very successfully applied to preventing both types of spotting on plated aluminum articles by one concern in Philadelphia, and it is a testimony to the success of the research work that this Society has carried on. Very severe examples of both types of spotting had been experienced with aluminum, producing oxidized and plated finishes, but the use of the protective lacquers that they recommended in the paper put out by the Bureau proved very successful.

THE ANALYSIS OF SILVER PLATING SOLUTIONS

By R. M. Wick

Read at Washington Convention, 1930

At the Bureau of Standards, we have started an investigation on silver plating, and as a necessary preliminary to this, we have studied the methods of analysis applicable to silver plating solutions.

The analytical requirements of the electroplater are quite different from those of the research chemist. The solution in the plating room may operate efficiently even though its constituents may vary 5% or 10%. But frequently in research work, where physico-chemical relations are sought, it is necessary to have methods of analysis available which are accurate to a greater degree. For that reason, in this search for methods of analysis of silver plating solutions, we have kept in mind both the needs of the research chemist and of the plater—the accuracy for the research chemist and accuracy plus speed and ease of operation for the plater.

We have confined ourselves to the study of the more important ingredients of the plating solution, namely, the free cyanide, silver, carbonate, chloride and ferrocyanide content. There are, of course, other substances in the bath present in lesser degree, which are of unknown effect on the operation of the solution. Should any of these "minor" constituents develop an importance in the future, we will study methods of analysis for them.

Determination of Free Cyanide

Perhaps the most important analysis to be made in the control of silver plating solutions is that of free cyanide. Of the many methods available for determining cyanide, one is outstanding—that is the titration with silver nitrate in the presence of potassium iodide. In 1915 there was some doubt case on the accuracy of this method. Messrs. Frary and Porter, in an investigation on the single potentials of metals in silver cyanide plating solutions, used two methods for the analysis of free cyanide—the analysis with silver nitrate, or the Liebig method, and the analysis with mercuric chloride, or the Hannay method. A "commercially pure" sample of sodium cyanide was used which analyzed 100% by the mercuric chloride method, and 97% by the Liebig method, a discrepancy of 3%, which seemed to cast doubt as to the accuracy of the Liebig analysis. Mr. M. R. Thompson last year prepared some very pure

alkali cyanide, and analyzed it by each of these methods, and found that the mercuric chloride titration gave 103%, while the silver nitrate titration gave 100%. It is true that the two methods show a discrepancy, but the discrepancy is not on the side of the silver nitrate method, but is attributable to the mercuric chloride titration.

In order to follow the course of the silver nitrate titration in detail, I used a silver electrode and followed the concentration of the silver ions in the solution as it was affected by the addition of silver nitrate. By this process, curves were obtained which throw light on the mechanism of the titration as well as the effects of various added constituents.

(Continued on Page 16)

THE Chicago Branch of the American Electroplaters' Society will hold its annual banquet and educational session at the Palmer House, Monroe and Wabash Avenues, Chicago, on Saturday, January 17, 1931.

The educational session is to start at 2:00 p. m. sharp. It is to be held in the foyer of the grand ballroom. The banquet is to start at 7:00 p. m.

The committee extends a hearty welcome to all platers and their friends to this affair.

Yours very truly,

Secretary and Treasurer
J. C. KRETSCHMER
1914 Warner Ave.
CHICAGO, ILL.

(See Fig. I.)

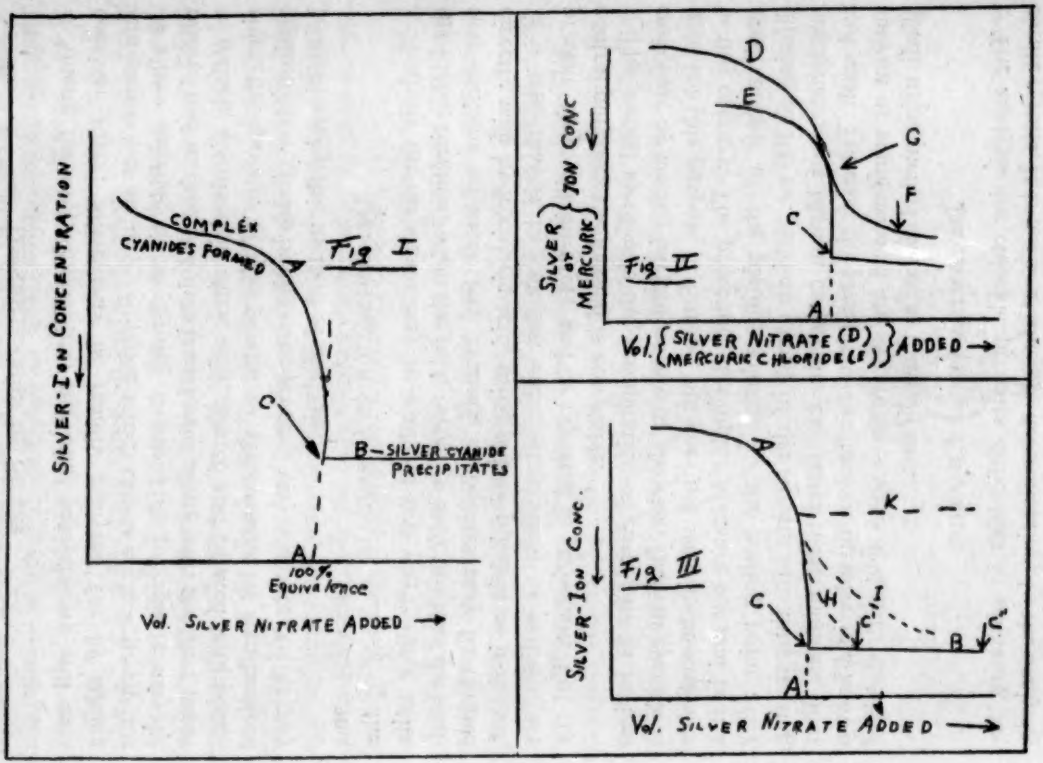
If we plot the amount of silver nitrate added during the titration versus the concentration of silver ions, we will get a curve similar to Fig. I. This point (indicating "A") is the 100% equivalent point, or the end of the reaction. A terrific increase in the amount of the silver ions occurs in the vicinity of the equivalence point. When the silver ion concentration reaches a value indicated by this line (indicating "B") silver cyanide precipitates. We will indicate the precipitation point by an arrow, "C".

Subsequently I did the same thing with the mercuric chloride titration, and found a curve which was like Fig. II, "E". The precipitation of the insoluble mercuric ammonium chloride serving as indicator for this analysis came at "F", but the point of inflection came at "G", coincident with that of the silver nitrate titration. Therefore we have shown that the two methods are equivalent and that the discrepancy occurring in the visual method is caused by the considerable solubility of the precipitation which occurs in the mercuric chloride titration.

If salts, such as carbonate, chloride, etc., are present in the solution, the sharpness in the vicinity of the equivalence point in the silver nitrate titration is decreased, and a curve is obtained like Fig. III, "H", with the precipitate appearing when the silver ion concentration has reached the proper value (indicating "C"). Ferrocyanide and ammonia exert a far greater influence than carbonate and chloride. With ammonia, the curve will come down like this (indicating "I" in Fig. III) and ferrocyanide is even worse.

How can you get around that? The solubility of silver iodide is much less than that of silver cyanide. This line (indicating "B") represents the precipitation of silver cyanide. But silver iodide will precipitate up here (drawing "K"). Therefore if there are added salts present which affect the curve down in this region (indicating below "K") and there is iodide present which causes precipitation up here (indicating "K") the precipitate serving as indicator will appear before the titration has been affected by these other materials which may be present in a silver plating solution under analysis.

This, then, is the explanation of the mechanism of the action of potassium iodide used as an indicator in the titration with silver nitrate. The errors caused by the presence of ferrocyanide and ammonia are corrected, provided sufficient iodide has been added to bring the point of precipitation above the point where ferro-


SILVER-ION CONCENTRATION
COMPLEX CYANIDES FORMED
Fig I
C
B—SILVER CYANIDE PRECIPITATES
A
100% Equivalence
Vol. SILVER NITRATE ADDED
D
E
G
F
C
A
SILVER OR MERCURIC ION CONC
Fig II
Vol. {SILVER NITRATE (D) MERCURIC CHLORIDE (E)} ADDED
P
K
H
I
C'
C''
B
C
A
SILVER-ION CONC.
Fig III
Vol. SILVER NITRATE ADDED

cyanide, for instance, affects the titration. 0.2 gram of potassium iodide or an equivalent amount of iodide solution will usually be found sufficient in titrations having a final volume of 150 c.c.

Determination of Silver

Among the other ingredients requiring analysis, we will next consider silver. Silver may be readily analyzed for by adding ammonium—or sodium—sulphide which causes a black precipitate of silver sulphide to be thrown down. This precipitate may be filtered and washed and then transferred along with the filter paper to a flask, dissolved in nitric acid, diluted and titrated with potassium thiocyanate. If the potassium thiocyanate be standardized against silver nitrate by the same process, very accurate results may be obtained by this method of analysis.

Determination of Carbonate

Analysis for carbonate may be made in two ways. First, after the Liebig titration, when the faint turbidity indicates that the solution contains no more free cyanide, carbonates may be titrated directly with hydrochloric acid, using phenol ptholein as indicator. It is true that if hydroxides, either ammonium or sodium, are present, they will interfere and be reported in carbonate. But for control purposes the method is acceptable.

The second method is the precipitation of carbonate as barium carbonate by adding barium nitrate or chloride. Barium cyanide is used for this purpose in Europe, but does not seem to be available in this country. The procedure is simple: Measure out and heat a small sample of the plating solution to the boiling point after diluting to 100 c.c. Add an excess of the barium salt, thus causing precipitation of barium carbonate. Let stand three minutes, filter and wash. Transfer the precipitate to a beaker, dissolve in a known amount of standard acid and titrate the excess acid with standard alkali, using methyl orange as the indicator.

Determination of Chloride

The analysis for chloride presents difficulties in obtaining accurate results. It is not a satisfactory determination. In the analysis, the interfering constituents must first be removed. It is possible to take the filtrate after the precipitation of silver, and boil it to expel the cyanide and ammonia. The carbonate and ferrocyanide may be decomposed with sulphuric acid; the filtrate then contains chloride

along with other constituents which will not interfere. An excess of silver nitrate is added to this solution, causing a precipitate of silver chloride to be formed. This is filtered off and washed thoroughly and the excess silver titrated with potassium thiocyanate as mentioned before in the analysis for silver. The accuracy of the method is not very great; being about 1% or 2%.

Determination of Ferrocyanide

Ferrocyanide is best analyzed for by decomposing the silver plating solution completely with concentrated sulphuric acid. This converts the iron present to sulphate. The iron may be analyzed for by any of the usual methods. Perhaps the most satisfactory is the titration with standard dichromate solution after the iron has been reduced with stannous chloride, and any excess tin salt removed with mercuric chloride. Diphenylamine may be used as an "inside" indicator and satisfactory results obtained.

Not that we do not recommend a special method for ferrocyanide. If iron is present in the solution, it is most probable that it is present as ferrocyanide. We have not yet detected any ferrocyanide in the silver plating solutions.

The methods of analysis just described will be found satisfactory for control purposes since they combine the qualities of speed and accuracy. All of the methods are volumetric and require only the simplest chemical apparatus. With a minimum of practice, the electroplater may control his silver solutions to insure continued efficient operation.

ABOUT LEADERSHIP

From the "Watchman-Examiner"

If you are good for nothing it is highly probable that the world will know it before you are fifty years of age. If you can really do things in any line of work your age will not hurt you. A while ago the Sherman Corporation, a firm of managing engineers of New York, took up the study of the executive management of 100 large corporations. Two men out of a group of 100 were between thirty and forty, thirteen of the men were between forty and fifty, thirty-four were between fifty and sixty, while thirty-five were between sixty and seventy; fourteen men were between seventy and eighty; two were more than eighty years of age. This is no particular encouragement to ordinary old age, but it is tremendously cheering to the man who is growing white, and who at the same time has industry, ability and enthusiasm. A great deal of fun is made at the expense of the United States Senate, but after all it is our highest legislative body. It is composed for the most part of old men. So is the Supreme Court. Do not bother about your age. Just give yourself unremittingly to your task. Make yourself indispensable. And to be indispensable one must above all things else be dependable.

SHOULD YOU FEEL INCLINED TO CENSURE

Should you feel inclined to censure
Faults you may in others view,
Ask your own heart, ere you venture,
If that has not failings, too.

Let not friendly vows be broken;
Rather strive a friend to gain;
Many a word in anger spoken
Finds its passage home again.

Do not, then, in idle pleasure,
Trifle with a brother's fame;
Guard it as a valued treasure,
Sacred as your own good name.

Do not form opinions blindly;
Hastiness to trouble tends;
Those of whom we thought unkindly
Oft become our warmest friends.

A. E. S. PAGE

Assembled Expert Scraps With and Without Significance

Platers' classes are being formed in many of our branches —Hartford, Conn.; Springfield, Mass.; Rochester, N. Y.; Bridgeport, Conn.; Boston and several others whose plans are not yet complete. We wish the secretaries would forward to Mr. Hirsch, Philadelphia Branch, chairman of the Bureau of Education, the names of the branch representatives that their names may be published in the REVIEW.

ELECTRO-CHEMISTRY CLASS

Instruction to Give Fundamentals in Sound Analysis

A class in electro-chemistry under the auspices of the Hartford-Connecticut Valley Branch, American Electroplaters' Society, has been formed in Springfield by Frank J. Clark, representative of the educational bureau of the national society. The class will be taught by L. C. Flowers of the Westinghouse Electric and Manufacturing Company and will meet at 34 Wilbraham Road. Class activities will commence Friday evening, November 15, and will continue for 20 weeks, meeting each Friday evening.

The class is designed to give fundamental training in electrochemistry and solution analysis. The class is open to members of the Society and their assistants in business.

The Manufacturers' Association of Connecticut has started a short practical laboratory course in the control of plating solutions. The course will consist of twenty lessons; three devoted to fundamentals and training in the use of the necessary laboratory equipment and seventeen to each of the metals used in electroplating.

The classes are held in the Weaver High School in Hartford, which has one of the most modern and thoroughly equipped chemistry laboratories in the state. Mr. E. L. Wood, chief metallurgist and electroplater for Landers, Frary & Clark, New Britain, is the instructor. Mr. Wood is an active member of the Hartford-Connecticut Valley Branch of the American Electroplaters' Society.

The tuition fee for the entire course is $25.

The classes started Thursday evening, November 6, at 7:30 p. m., and will be held weekly until the course is completed.

THE LOYAL BOSS

"The late Eugene Felt, the inventor of the adding machine," said one of his Chicago friends, "was a loyal employer. The employee who tried to undermine another employee never got anywhere with Mr. Felt.

"A foreman came to him one day and said of another foreman:

" 'I have good proof, sir, that Jim Jackson is leading a double life.'

" 'A double life, eh?' Mr. Felt chuckled. 'So that's how he manages to do twice as much work as the most of you, is it?' "

The optimist fell ten stories.
At each window-bar
He shouted to his friends:
"All right so far."

NEWARK BRANCH

The Newark Branch held its regular monthly open meeting. President Calbrese opened the meeting at 8:35 p. m., there being 67 members present.

The Newark members enjoyed their visit to the Hanson Van Winkle Munning Co. at Matawan, N. J., and a splendid time was had by all those attending.

The speaker of the evening was Dr. K. Graham of the University of Pennsylvania. "Corrosion of Metals" was Dr. Graham's subject.

Describing the meaning of research. Proper study and investigation, influence, conclusion. Naming the different kind of corrosion test, and the treatment accorded the samples in the salt spray test, interminute immersion test, humidity test chamber, the atmospheric test, A.S.T.M. test, aerated water test. Each test was described in detail, and was explained as only Dr. Graham can, drawing diagrams of recent researches made and explaining same.

Dr. Graham was tendered a rising vote of thanks. Mr. Charles Proctor spoke on his trip to Europe this summer, and the fine quality chromium plating being done there. Meeting adjourned 10:50 p. m.

GEORGE REUTER, *Secretary.*

CLEVELAND BRANCH

The regular monthly meeting of the Cleveland Branch was held on Saturday evening, November 1, with President E. Steen Thompson in the chair. The attendance was good.

Mr. Singler, our member of the Educational Bureau, asked how many members would be interested in taking a course in the analysis of solutions. Because it would be impossible for out-of-town members to attend a class it was decided to have a qualified member demonstrate the analysis of one constituent of a solution at each meeting, after the regular session. To make time for this a motion was carried advancing the time of our meeting from 8:15 to 7:30.

Mr. Zadowski announced that he expects to attend the meeting of the Research Committee in Chicago. He was urged by the Cleveland Branch to promote the simplified method of control of cyanide solutions.

Our Librarian read a paper on the "Improvements in Black Rustproof Finishes." After a short discussion one of the members told about his problems in connection with tin finishing. One of the facts brought out was that a brass casting loses weight on being immersed in a hot tin bath.

A motion to adjourn was carried at 10:30 p. m.

PAUL STAMM, *Secretary.*

NEW YORK BRANCH

The regular meeting of New York Branch, A.E.S., was held at World Building, Park Row, N. Y. C., October 10, 1930—Vice-President Ligouri presiding.

It was decided to hold our good and welfare meetings on the first Friday meeting, starting in November, which shall be an invitation meeting, the Librarian having made arrangements with a speaker for that evening.

A paper was read on "Deplating Aluminum for Coloring Purposes." Full details were given.

Question—What is a good dip for 12% aluminum silicate. castings?

Three parts nitric acid, 1 part hydrofluoric acid.

Question—What is the best means of removing burnt residue off aluminum toasters? Present method used is to burn off with a torch.

Advised to soak toasters in carbon tetrachloride.

Question—How is aluminum etched?

A 50.50 solution of perchloride of iron, or use a solution of sodium fluoride.

Our second meeting was held on October 24—President Haushalter presiding. We were all glad to have him with us again, after his illness of many weeks.

Question—What is the cause of work in nickel solution plating being heavy on the bottom and light on the top?

After discussing this problem, it was suggested to reduce the density of solution and lower the voltage.

Question—Wanted, a formula for white gold strip.

Hydrofluoric 1 part, sulphuric 1 part, water 2 parts, using a lead pot.

ARTHUR GRINHAM, *Recording Secretary.*

HARTFORD-CONNECTICUT VALLEY BRANCH

The Hartford-Connecticut Valley Branch held its regular monthly meeting on Monday evening, October 27, at the Springfield Chamber of Commerce Room, Springfield, Mass.

The meeting was called to order at 8:30 p. m. with President Beloin in the chair. Minutes of the previous meeting were read and accepted. One bill was voted paid. Mr. J. C. Rogers, of New Britain, was elected to active membership in this branch. It was voted to pay the Secretary-Treasurer of the Hartford Branch, starting with the current year, the sum of fifty dollars ($50) as a yearly salary. He is also granted, as has been the custom, his annual dues as at present.

As no speaker had been secured for the evening, the time was spent in the discussion of the forming of a platers' class in solution analysis. The outcome of the discussion brought forth the forming of a class in Springfield, of at least nine members, that number being present and signified their desire to start a class. No doubt there will be more members to this class by the time work is started. The class will have as an instructor Mr. Flowers, research and chemical engineer of the Westinghouse Electric and Manufacturing Co., of Springfield. The class will meet and conduct their work at the T. J. Murray Manufacturing Co., in Springfield, on each Monday night at 7:30 o'clock, starting Monday evening, November 3. The course will include instruction and studying of general chemistry, analysis of solutions, and the effect of various factors on the deposition of metals. The course

will extend for a period of twenty weeks with an average of two to three hours per night.

The Branch is very much indebted to Mr. Murray, one of our active members, for his kindness in offering us, not only a place to hold our class, but for his help in equipping it with the necessary equipment, and also giving us the advantage of his wide experience in the electroplating field. "Hats off to Mr. Murray!"

Mr. Wood, chief chemist for the Sanders, Frary & Clark Co., of New Britain, Conn., also explained to us the work that the Manufacturers' Association of Hartford County are doing. They are to conduct a class in chemical analysis of plating solutions. This class is to run for a period of twenty weeks, starting Thursday night, November 6, and to continue every Thursday night for the twenty weeks. This class is open to the public, and the fee charged for the course is twenty-five dollars ($25). The class will receive instruction from Mr. Wood, and it will consist of practically the same work that is to be conducted by Mr. Flowers, mentioned above.

Either one of these classes offer to the plater a golden opportunity to acquaint himself with the knowledge that he eventually must possess if he is to become a successful plater and executive, so let's take full advantage of this chance, so that in the future we can't claim that we never had a chance to learn solution analysis and control.

The members were also entertained by some interesting, as well as humorous, remarks from Mr. Orr of the Ames Sword Co., Chicopee.

The meeting was attended by twenty-six members and visitors, and was adjourned at 10:30 p. .m

V. E. GRANT, *Secretary.*

TORONTO BRANCH

The regular monthly meeting of Toronto Branch, A.E.S., was held on Monday, October 27, 1930, in Canadian Foresters Hall. President J. Walker was presiding officer. The routine business was carried off quickly. Owing to a very bad rainstorm the attendance was rather small. The meeting approved of a testimonial to be given to Mr. Magill, one of our members, whom we are appointing as a Branch honorary in recognition of his splendid services to the Branch. A report was heard on the progress of our platers' class which has reopened for the fall season. At the close of this a session of discussions amongst the members took place, to be followed by adjournment.

H. WM. GRAHAM, *Secretary-Treasurer.*

BOSTON BRANCH

Boston Branch met on Thursday, the 13th, at the American house at 8 p. m., with President Gale in the chair.

After the regular order of business the committee on the chemistry class made a report which impressed the members so much that they were given a vote of thanks for the very good work they had done.

Then a motion was made that a committee of five be appointed with full power to see the members about joining the class and to go ahead and make all arrangements for a class of twenty or more.

After much discussion of the chemistry class the chromium solution was the discussion for the rest of the evening, and the main point of it all was what becomes of the sulphate in the solution? Where does it go?

Boston Branch asks this question and will be glad to hear from any of the other branches on it.

What becomes of the sulphate in the chromium solution? Let's hear from all the members on this.

Meeting adjourned at 10:45 p. m.

A. W. GARRETT, *Secretary.*

CHICAGO BRANCH

The regular monthly meeting of Chicago Branch, A.E.S., was held on Saturday, November 8, 1930, at the Atlantic Hotel.

The meeting was called to order with President S. J. C. Trapp presiding and all officers present.

Mr. Harold Faint read a paper written by Dr. Watts and issued by the Electro-Chemical Society, on polishing and plating radiator shells. This proved to be very interesting and should be a great help to the plater whose work is exposed to the elements.

Chicago Branch is getting ready for its annual educational session and dinner dance.

The Grand Ballroom of the Palmer House at Wabash Avenue and Monroe Street has been secured for the event and the date is January 17, 1931.

The educational session will be held in the Foyer of the Grand Ballroom and will start at 2 p. m. The dinner dance will be at 7 p. m.

The committee extends a cordial welcome to all platers and their friends.

The following questions were found in the question box:

Question—Can rough cast iron be bright plated in brass sol.?

Answer—It was thought that if the castings were given a coat of copper heavy enough to stand bright dipping and then brass plated, a satisfactory finish would be obtained.

Question—What causes streaks in an acid copper sol.? They seem to be burned into metal and cannot be buffed out.

Answer—There are probably several reasons for this condition. Look carefully to the following suggestions: lack of sulphuric acid, sol. too cold, improper rinsing, impurities in anodes or oxidation of the anodes.

Question—What can be used for a brightener in a still cadmium sol.?

Answer—It was stated that agitation and as high a current density as the work would stand would give a bright deposit. There are in addition reagents such as instant postum, nickel and zinc, but these are all covered by patents.

Question—What is the best way of plating nichrome?

Answer—The surface should be slightly etched in a sol. of sulphuric acid

with reversed current. A sulphuric nickel strip should be good for this purpose.

Question—What can be done to a nickel plating sol. to make the deposit very soft? This sol. is used to plate on sheet iron and steel.

Answer—Warm the sol. if possible. Watch the Ph. so it does not fluctuate too much, also see that the metal and chlorides are up to normal. Add 1 or 2 oz. of magnesium sulphate per gal.

Question—Can rough cast iron be plated bright in a cadmium sol.?

Answer—It is rather difficult to obtain a bright deposit on a dull surface, as the finish depends on the underlying surface for its lustre. It was thought that if the work could be tumbled bright or cleaned and wire brushed and then flashed in nickel, a bright deposit could be obtained. Also note question No. 3.

J. C. KRETSCHMER, *Secretary-Treasurer.*

ROCHESTER BRANCH

On Friday evening, October 17, Rochester Branch held their monthly meeting with President Reama in the chair.

The application of Mr. W. A. Heinrich was accepted and he was elected an associate member. The Hotel Committee reported they had chosen the Hotel Seneca as headquarters for the coming convention next June—and the Society would meet there starting with the November meeting. Mr. G. A. Lux reported that school would start Wednesday, October 22, at 8:15 p. m., and he expected all who were interested to be present, also that out-of-town members of Rochester Branch would be furnished lessons of the chemistry course if they were interested for a fee of $5 to help pay expense of mailing and printing of lessons. Rochester members are to be assessed $15 for the course. We know our school will be a success with Mr. Lux in charge.

Mr. William Throup of Syracuse was with us and we all enjoyed his visit. We wish that more of our out-of-town members would make an effort to attend our meetings.

Mr. S. P. Gartland is busy with Mr. R. P. Lopez urging the boys on for the coming convention. I am sure that Rochester Branch will be on the job 100 per cent, and all I can say is it will be just too bad for those who do not attend the convention in Rochester next June.

CHAS. GRIFFIN, *Secretary.*

PHILADELPHIA BRANCH

The regular monthly meeting of Philadelphia Branch was held at the University of Pennsylvania with the President, S. T. Lunbeck, presiding.

This was a large and interesting meeting, as we had Mr. Francis Bowman of the Abrasive Co., Niagara Falls, N. Y., with us.

Mr. Bowman spoke on abrasives from their discovery to the present time, showing by motion pictures the various stages of making abrasive wheels and

illustrating the many sizes and shapes in which they are made for quick grinding and finishing.

At the close of his highly instructive talk Mr. Bowman was given a hearty vote of thanks.

Philip Uhl tendered his resignation as secretary and treasurer of the Philadelphia Branch, to take effect December 1, 1930.

J. E. Underwood was appointed as his successor.

PHILIP UHL, *Secretary.*

BRIDGEPORT BRANCH

Meeting called to order at 8 p. m. November 6, 1930. Roll call of officers. Bill Stratton and Bill Ehrenchrona absent. Minutes of last meeting read. Motion made and seconded that be accepted. Motion carried.

REPORT OF SICK COMMITTEE

Mr. Wm. Stratton was reported very ill in the Bridgeport Hospital with a very severe case of appendicitis. The members of the Bridgeport Branch sincerely wish Bill a speedy recovery. The Sick Committee were authorized to send Bill flowers.

John Slattery, Sr., was also reported to be still on the sick list.

REPORT OF CHEMISTRY CLASS COMMITTEE

Mr. Ray O'Connor, chairman of the Chemistry Class Committee, sent out a letter to all members of the Branch briefly outlining a course covering the fundamentals of electroplating and the analyses of solutions. The letter requested all interested to be present at this meeting. Over twenty-five members so far have signified their intentions of taking the course, which is to be held at Sterling Laboratory, Yale University, New Haven, Conn. It is expected to be able to start the course by the first week in December. All members of the Branch pledged their support to this undertaking. A small fee is to be charged each member taking the course to cover chemicals and the necessary laboratory equipment. Full details regarding the course should be ready by the next meeting.

REPORT OF PROGRAM COMMITTEE

The Program Committee reported that "Old Timers" night will be held Friday evening, November 21, 1930, at the Contract Plating Co., Bridgeport, Conn. The speaker of the evening is to be Mr. George Hogaboom of the Hanson Van Winkle Munning Co. The topic will be "High Acid Nickel Solutions and the Heat Treatment of Chromium Deposits." Mr. Hogaboom is indebted to Dr. H. C. Mougey and Mr. R. J. Wirshing of the General Motors Research Laboratory, Detroit, Mich., for the permission to give this talk and for the loan of the exhibits to illustrate the points discussed. Refreshments will be served after the meeting.

It was voted to change the time for open meetings so that they would not interfere with the class in chemistry.

Open meetings will be held on the third Tuesday of the month instead of Friday, hereafter. President George Wagstaff appointed Bill Flaherty and

Ben Kusterer as refreshment committee for "Old Timers" night. It is hoped that Bill and Ben will do their duty.

The application of Mr. Albert J. Rosenthal of the Underwood Elliot Fisher Co., Bridgeport, Conn., was acted favorably upon by the board of governors.

It was voted that the Branch present to Mr. Wm. Ehrenchrona, Vice-President of the Branch, an electric clock as a token of their appreciation for his meritorious service as secretary and treasurer of the Branch, which position he held for seven years.

Treasurer's report read. It was voted to accept report as read.

The Secretary was instructed to communicate with the Hartford Branch in regard to a joint banquet and educational meeting, to be held in the spring.

PLATING PROBLEMS

The question was raised as what material would be best suited for making a tank to hold a 1—5 nitric acid solution.

A tank made of stone-ware or of special alloy steel was recommended.

Mr. H. Braun asked the best way for removing grease and oil from die castings. The use of a vapor degreaser was recommended.

Meeting adjourned at 10 p. m.

T. H. CHAMBERLAIN, *Secretary and Treasurer.*

LOS ANGELES BRANCH

The regular monthly meeting of this Branch was held as usual the second Wednesday, October 8, at the Pig 'n' Whistle, 840 W. 7th Street.

Thirty-eight sat down to a very enjoyable dinner, after which the regular business session was held with C. E. Thornton presiding.

Frank C. Rushton reported on the progress and arrangements for the General Assembly of Platers on the Pacific Coast to be held October 18.

The meeting was then turned over to Robert Gripp, the Librarian. Dr. Fisher, Professor of Physics and Chemistry, gave a very interesting talk on "Electrolytic Decomposition" and action of negative and positive ions in plating solution.

Alex. Regmunt showed a simple method of analyzing a chromium solution for chromic acid content. Anyone interested write for method.

Question box contained the following:

Question—How to successfully nickel and chromium plate work or parts of which have been soldered.

Answer—Make up a solution composed of a mild cleaner. Add 1 oz. sodium cyanide and 1 oz. copper cyanide per gallon. Strike in this before nickel plating.

The meeting adjourned to various street corners at 10:30.

M. D. RYNKOFS, *Secretary-Treasurer.*

The Los Angeles Branch held their second annual Assembly of Platers on the Pacific Coast October 18, 1930, at the Hall of Westgate Lodge.

Three hundred and fifty sat down to a sumptuous dinner, after which they were entertained by a wonderful program, the opening number being a

three round bout between the fleaweights "Fighting Bob Schuler" and "Dynamite Jack Schuler." It was a knockout. This was followed by the R.K.O. Entertainers with some Orpheum headliners.

The singing contest was won by C. H. Floyd, 922 E. [illegible]th Street, and could he sing? The prize was $10 donated by H. J. Richards from LaSalco Inc., St. Louis.

On behalf of the members, Chairman Frank Rushton made a presentation of a set of silverware to M. D. Rynkofs, Secretary and Treasurer of the Branch, with remarks that it was a slight recognition of the work of a faithful, hardworking, and the best Secretary in the A.E.S.

A number of out-of-town visitors were present and all agreed the program could not have been beaten.

F. C. RUSHTON, *Chairman.*

WATERBURY BRANCH

Pretty near the entire membership of Waterbury Branch, along with friends and visiting members of the A.E.S., turned out Friday evening, November 14, to hear Dr. L. C. Pan of The City College of New York deliver his first address in this city. The topic chosen for the occasion was "Throwing Power of Cyanide Copper Solutions." With the aid of lantern slides and charts, and some samples of laboratory experimental work which were passed around, an interesting hour was had. During the course of Dr. Pan's address several formulas for copper solutions were given. At the conclusion of his remarks the speaker spent some time in answering questions. The second speaker of the evening was Mr. Habelstadt, who interested those present with a demonstration of a new testing apparatus. The simplicity and quickness of the method met the approval of all. President Wm. Gray extended the speakers the thanks and appreciation of all present for the very educational program.

Favorable action having been taken in the applications of John F. Mesek, Toleau Co., and Philip J. Lopiesti Mattahick Co., they were declared elected. Announcement was made that the next meeting will be one of special importance, and will take place Friday, December 12. Entertainment and refreshments are in the program.

W. F. GUILFOILE, *Secretary.*

DETROIT BRANCH

Detroit Branch held its regular monthly meeting Friday evening, October 7, at the Statler Hotel—President Jos. H. Hansjosten presiding. A committee was elected to represent the Branch with the Supreme Educational Bureau, and is made up of go-getters. The officers are making every effort in planning for a class in simple methods of analyzing plating solutions.

A talk on the equipment and methods of plating in the days gone by was given by the visiting brother of Chicago Branch, Mr. Walter F. Donnelly, and was well received.

CHAS. M. PHILLIPS, *Secretary and Treasurer.*

APPLICATIONS

	Branch
Albert J. Rosenthal, Underwood, Elliot Fisher Co.	Bridgeport
Marion Longfield, 1321 S. 59th Ave., Cicero, Ill.	Chicago
Russell Harr, Western Elec. Co., Chicago, Ill.	Chicago
Morris Brown, 420 9th Ave., La Grange, Ill.	Chicago
Murray B. Harris, 12824 Mack Ave. (Active)	Detroit
Chas. R. Beaubian, 1219 Pine Bank Bldg. (Asso.)	Detroit

ELECTIONS

J. C. Rogers, New Britain, Conn.	Hartford-Connecticut Valley
J. Owens (Asso.)	Newark
R. Mears (Asso.)	Newark
Austin Fletcher (Active)	Newark
W. A. Heinrich (Asso.)	Rochester
Carl C. Nagel, 1310 3rd Ave., Rockford, Ill.	Chicago

REINSTATEMENTS

O. G. Smidel, 3908 N. St. Louis Ave., Chicago	Chicago

SUSPENSIONS

Henry Weber, 3208 Independence Ave., Kansas City, Mo.	Chicago
Geo. Tinnerman, 2554 Grand River Ave.	Detroit
Henry Zimmerman, Basline P. O., Mich.	Detroit

TRANSFERS

C. F. Nixon	From Chicago Branch to Detroit
Chas. Stiers	From Newark Branch to Chicago

RESIGNATIONS

W. W. Wells, Sr.	Toronto

APR 1934

RESEARCH COMMITTEE

Chairman, JACOB HAY,.....6920 Ottawa Ave, Chicago, Ill.
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